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Kenya: Education for Better Dairy Production

Kenya, a developing country located in Eastern Africa, is home to 47,615,739 Kenyans spread over 580,367 sq km of land. As much as 73.5% of Kenyans are living in rural areas, many flocking to the shores of Lake Victoria. The country has a very young population, the median age being 19.7 ("The World Factbook — Central Intelligence Agency"). "Forty-two percent of its population...live below the poverty line" ("UNICEF - Overview - Kenya At A Glance"). This young population is ranked 6th in the top ten countries in poverty in Africa ("Kenya Ranked Sixth On Extreme Poverty Index"). Kenya is struggling with many issues and needs the proper help to work toward success. Education of the populace will be key to addressing issues associated with food insecurity and poverty. With hard work and determination, Kenya will be able to flourish into a booming economy.

Located near the Indian Ocean, Kenya has two main climates, "tropical along the coast to arid in the interior". Climatic issues of drought and flooding during the wet season are common. Land consists of low plains, highlands, and fertile plateaus. ("The World Factbook — Central Intelligence Agency") Agriculture is a leading industry in Kenya today with over 75% of the population participating in some way. "Agriculture is the backbone of Kenya's economy and central to its development strategy" ("Kenya"). Large interest in agriculture calls for the need for specialized and direct education for civilians. Pushing involvement in agriculture would benefit the country's economy as new interest is necessary to establish agricultural pursuits on the land open for use. Of the landscape available for agriculture, 20% of the land is arable, but currently only 8% of that is being used ("Agriculture - Kenya - Export, Growth, Area, Crops, Farming, Policy, Sector"). Increased usage of this land would benefit the large population of farmers in Kenya. Of the many agricultural industries, the dairy industry is one with much room for improvement. Education of proper handling on dairy farms will increase quality and profit of farms as well as benefit the nutritional well-being of the country.

Family is very important to Kenyans. There are three common households in Kenya all branching off different cultures. In recent years change has come to Kenya with the rise of the Christian lifestyle. Some households are very large and consist of extended family all living together, other households are similar to western style with parents and children occupying the household. In areas that are not influenced by Christian teachings, it is common to find Polygamy, a husband with many wives. In these households there are separate huts for each wife and her children, with the husband in his separate hut (Way Of Life, The People Of Kenya, Kenya, Africa - Kenyan Runners, Kenyan People, Shanty Towns, Multiple Wives, Turkana). The type of family is heavily impacted by the area they come from and the religion they practice. Family type and cultural influences also affect the nature of agricultural and educational practices.

The cuisine of everyday life consists mainly of corn, potatoes, and beans although most families do not get the proper nutrients needed ("Food In Kenya - Kenyan Food, Kenyan Cuisine - Traditional, Popular, Dishes, Diet, History, Common, Meals, Staple, Rice"). Prices of food are often too high for families to purchase and widely not available ("Food Security Report (Prepared By Kenya Agricultural Research Institute | Food Security Portal)"). Food security is a major issue in Kenya as most families do not know where their next meal will be coming from.

Over the last decade, Kenyan government officials have been working to improve the educational system. Currently primary and secondary education is free, yet 1 million children fail to complete their education.

Education is necessary for any improvements to be made in the developing country. With the common system, “Formal schooling begins at the age of six, with compulsory and free basic education running through to the age of 14. Students progress to the academic secondary cycle, technical schools or trade schools, from the basic cycle. Secondary schooling is also free but not compulsory” (“Education In Kenya - WENR”). Proper education allows students to have a better chance at being employed and helping their country to succeed.

The largest employer in Kenya is the agricultural industry. Agriculture has a “contribution one-third of GDP” with $\frac{3}{4}$ of the Kenyan population involved in agriculture. Most individuals are employed on farms or work in the agricultural industry. These numbers may make it seem like Kenya is in good positioning for their economy to flourish, but still there is a 40% unemployment rate (“The World Factbook — Central Intelligence Agency”). Kenya is slowly making improvements in the area of education but there is much more that needs to be done to make Kenya a prosperous and educated nation.

Agriculture employs a majority of the Kenyan population, yet famine still spreads across much of the country. Kenya’s involvement in agriculture spans into many different directions. One industry that has much room for improvement is dairy production. Kenya ranks number six for the population of dairy cattle, ranking one ahead of the United States, but when it comes to production they do not even make the top 15, while the US takes the number one spot for production (“Statistics: Dairy Cows”). This disparity leads you to wonder what is causing Kenya to lag behind. Currently Kenya is not producing a quality dairy product which would be expected with the available resources. With large amounts of cattle there has to be a problem and solution for efficient dairy production.

Kenyan dairy farmers face problems with inadequate housing for cattle, overgrazing, and little access to market their products. The most common type of farm is smallholder “where 80% of dairies have fewer than 5 cows.” Each cow produces approximately 9 to 11 pounds a day, some of that milk is consumed by the family and what is left is sold to be consumer raw or sent to a processing plant. Cattle are not fed by a grazing system, rather a cut and carry of grass and crop residue feed source (Dolecheck & Bewley, 2018). Currently farmers in Kenya are also facing a drought, making it hard to feed their animals (“Kenya: Drought - 2014-2018”, 2018). Improvements in the industry would benefit farmers in Kenya but also urban residents looking for nutritious food available and ready for purchase. Studies were completed to look at what the main problems facing Kenyan dairy farmers. From one study, issues arose pointing to one very important issue, there was “inadequate dairy production information necessary for the optimal quality of dairy products” (Ter-Hemen). A good product can not be expected if there is not adequate information available for farmers to learn the most efficient and productive ways to operate a dairy operation.

A solution to this issue would be the introduction of an educational program open to Kenyans. Due to the production success demonstrated by American dairy operations, the program would begin in America and end in the small dairy farms in Kenya. Eventually leadership and responsibility for educational programs would be transferred to the Kenyan people. Starting off, it is necessary to have educated American dairy farmers and dairy experts interested in helping build small research/sample farms in Kenya to replicate the ideal dairy farm for Kenyan conditions. The farms would always be kept at the greatest quality and efficiency using up-to-date methods and equipment. The facility would consist of a calf to cow operation, milking facilities, and a pasteurization and distribution plant. Originally a board of 15 people would be chosen from Kenya to travel to the United States for training and study and then would return to Kenya to manage the educational farms and provide educational outreach for farmers. The board could be made up of Kenyan farmers, Kenyan professors of agriculture, and Kenyan community investors. On the farms in Kenya, local farmers would learn how to improve dairy operations in the areas of infrastructure, nutrition, herdsmanship, milk quality, and marketing. Farmers helping farmers would help speed up improvement of quality and efficiency in dairy operations while providing another important protein

source for the Kenyan diet. The process would be focused on small farms working with low budgets, starting with 20 head dairies and growing as success is observed. The educational farms would be an educational “school” for dairy herd management which would lead to the formation of small cooperative dairy farms. The cooperative farms could be operated by small groups of farmers from the same community or same family in order to pool resources and costs associated with marketing and production. Costs of education would be paid for originally by non government organizations such as American foreign aid organizations, private Kenyan investors, grant opportunities through the World Bank or similar organizations, and would eventually be supported by income from farm production. Dairy production could move from a subsistence situation to one in which farmers are producing enough product to provide additional family income and grow business opportunities.

Infrastructure education would consist of the building quality in which animals should be kept. To produce the best quality product, cattle need to be in a comfortable area and kept safe from the weather events. Having adequate shelter for these animals will allow them to produce a better quality and quantity of milk. In this stage of education, students would be learning about the proper facilities in a barn, and how to keep them up to date. They would learn about ways to build facilities for low cost and how to maintain them. Cooperatives of local farmers could help establish buildings to house animals which would benefit the entire community.

Nutrition education would revolve around what a cow needs in its diet and how to grow those nutrients. In this section of education, students would learn proper rations for cattle and investigate what and how Kenyans can make the most of growing their own feed instead of buying it. Farmers could address issues related to drought tolerant plants and improved plant genetics for adequate and optimal feed sources. Focusing on planting crops and using manure as fertilizer, along with land management would move farmers in the right direction to achieve goals. Nutrition would not only be for dairy cows but also analyzing the importance of the first month of a calve’s life. Learning about the importance of feeding calves colostrum for the first feeding and also how the first month of feeding projects the quality of the cow are important components. Nutrition is an important stage in the educational process, without proper nutrition cows can not be expected to give a good product.

Herdsmanship will have three main goals, learning about cows in general, how to care for them, and how to handle them. Starting with a baseline education of different breeds of cattle, stages of life, and reproduction. This will help producers to understand their cattle and know when something is wrong. Next, they would learn how to keep their animals clean. How to bed their animals, keep pens clean, and keep clean water in front of them. Handling cattle is important to make sure the producer stays safe when working. In this area, they would learn how to deal with angered cattle and how to move a large group of cattle. Proper herdsmanship will keep producers safe and keep cows happy and healthy. Also in this section is the health of animals. Students would learn about how to diagnose and treat common sickness in cattle. They would learn about what they can do before they have to call the vet in. They would learn about the calving process and stages of life in cattle. They would learn about vaccinations that can be made available to farmers and how to administer them. They would also be able to investigate breeding and genetic information available for producing cattle to best handle the Kenyan environments.

Milk Quality is very important. The purpose of drinking milk is for all of the many nutritious vitamins and supplements it provides us. When milk is not handled with care, sanitized, and properly transported, these nutrients are lost and the purpose of drinking milk is gone. To provide a nutritious and delicious milk product, many standards have to be followed. Milk quality needs to be maintained from the barn to the time the milk is consumed. In this section, students will learn how to inspect milk house facilities, learn the protocol for pasteurization, and be ready to assure that only quality milk is sold to consumers.

Other pieces of the educational puzzle are processing and marketing. These would focus on how farmers

can make and sell their products. The suggested path of sales would be through a co-op program. Co-op's would be located in the center of communities and would be in direct contact with the farmers. A small group of farmers would own the company together. The milk would come to this central area and be processed and sold. Milk would be pasteurized and packaged. One suggested way of pasteurization would be Ultra High Temperature (UHT). This method allows milk to not have to be in refrigeration, helping families that have no way to keep milk cool. UHT allows for greater shelf-life to make long distance transportation possible without refrigerated trucks or tanks. Milk could also be made into powdered form or cheese products. Along with the processing plant there would be a store that would sell the milk products to the community. Sales would be distributed directly back to the farmers and co-op members.

After working through these five sections of education, students would have the chance to run the farm together while practicing what they had learned. The original learning period would be approximately one month. Following the training period they will clear up anything they are still not sure about and then they will go on to the next step of visiting farms through their designated area to teach others about what they have learned. It would be set up that each graduate student would have the option to go back to their farms or enter the program of education, inspection, and communication. In the program they would visit farms and talk with producers about what they can do to improve their farm and where they can go for help. They would hold monthly meetings, each time focusing on a new area in the industry that needs attention. This local farmer to farmer initiative would assure the continuity of the program and make it more acceptable from a cultural standpoint. The dairy industry already exists in Kenya. The educational solution is improving the situation without starting from scratch.

Inspection of farms is important to make sure that all standards are being met. Visiting all farms in the area monthly would help to make sure that a quality product is being produced. While visiting, there would be a checklist that has to be met and each time this is met, the farmer would be entered into some sort of incentive. Communication would bounce back and forth from the center/farm from which the student expert received an education. Student experts would explain what else needs to be done to help farmers, would be asking questions, updating knowledge, and consulting with specialists on issues. Also as a part of their job, they would find people that would be interested in pursuing the same job they are completing. Finding others to work with them and help them as the industry begins to get larger ensures the continuity of the educational process. Communication would be a vital component of helping this solution to succeed.

After the program is up and running college study abroad trips would be available for United States agricultural students. College students studying in the agricultural majors would be given the chance to apply. When they are in Kenya they would be touring the farms and helping educate the students in Kenya while learning themselves. The hope is that they would bring a new perspective and another way of help while gaining cultural and agricultural knowledge themselves .

After this program would have been functioning for a period of time, the hope is that the dairy industry would make available new jobs, sustaining more agriculture, and producing a nutritious product. The Kenyan dairy industry would be a start to finish production, keeping all produce in the country to be used until in a stable position to export. Trying to work inside the country upgrading production before working outside the country. Initially this would provide increased protein and calorie sources for Kenyans, especially children. Starting in the calving barn, to the milking barn, to the milk plant, and finally to the tables of many families in Kenya. This solution may come along with challenges at times and may need to be adjusted. Funding will be the first goal to reach, with the support of American organizations, NGOs, and in cooperation with the Kenyan government, a solution may be attained to better the Kenyan dairy industry. Through this small work, hopefully, other industries will pick up on the same ideals and begin to educate others on modern tactics of agriculture. When Kenyans work together

they will strive to build up the economy, create new jobs, and feed more mouths with delicious and nutritious products.

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